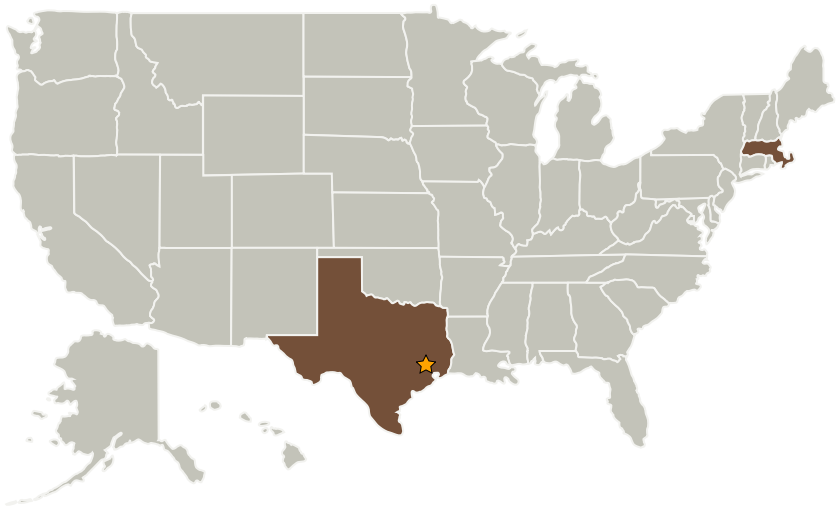
Shape Memory Bio-Suit, Phase I

Completed Technology Project (2006 - 2007)

Project Introduction

Spacesuit systems for planetary EVAs must maximize human productivity and provide the astronaut with the capability to perform useful work tasks. Mide plans to work with MIT to develop mechanisms to augment astronaut productivity during advanced EVA missions. We propose to demonstrate the feasibility of using shape memory polymers (SMPs) to provide pressurizing life support in the Bio-Suit, an advanced EVA system based on mechanical counterpressure (MCP) that is being designed to provide a "second skin" biomechanically and cybernetically augmented human performance capacity for planetary exploration. SMPs are "smart" polymers whose pliability makes them comfortable to wear against the skin. However, their material properties and shape can also be controlled using external stimuli such as temperature, electricity or stress, making them particularly appropriate for use in a "second skin" spacesuit that adapts to the astronaut's shape changes during EVA movements. Our initiative would be the first-ever demonstration of the use of smart materials in an MCP spacesuit; as such, this innovation could potentially accelerate the development of space-rated MCP suits because it would provide both a means of increasing the pressure production and control whilst maintaining user comfort and usability ? competing requirements which have hindered development of previous MCP spacesuits.

Primary U.S. Work Locations and Key Partners



Shape Memory Bio-Suit, Phase I

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Shape Memory Bio-Suit, Phase I

Completed Technology Project (2006 - 2007)

Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Mide Technology Corporation	Supporting Organization	Industry	Medford, Massachusetts

Primary U.S. Work Locations	
Massachusetts	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.1 Materials
    - TX12.1.8 Smart Materials